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RDT&E PROJECT NO. 1-E-6-50212-D-326-10

USATECOM PROJECT NO. 4-4-6015-05

SERVICE TEST
of
AN/APX-68 LIGHTWEIGHT AIRBORNE TRANSPONDER

Supplemental Report
by
Mr. Claud Short
November 1968

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36360

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USATECOM-4-4-6Ø15-Ø5

(17) 1-E-65Ø212-D-326Ø

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APPROVED:

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President

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STEBG-TD

SUBJECT: Supplemental Report of Service Test of AN/APX-68 Lightweight Airborne Transponder, RDT&E Project No. 1-E-6-50212-D-326-10, USATECOM Project No. 4-4-6015-05

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1. REFERENCES

a. DA-Approved Qualitative Materiel Requirement, "Air Traffic Control Radar Beacon, Identification Friend or Foe (ATCRB/IFF) System (U) (CSCRD-64)," 7 April 1965, classified Confidential.

b. Plan of Test, "Engineering and Service Test of Lightweight Airborne Transponder AN/APX-68 (AIMS Program) (U)," US Army Electronics Proving Ground, 1 May 1965, classified Confidential.

c. Report of Test, "Service Test of AN/APX-68 Lightweight Airborne Transponder (AIMS Program) (U)," USATECOM Project No. 4-4-6015-05, US Army Aviation Test Board, 3 June 1966, classified Confidential.

d. Report, "Engineering Test of Lightweight Airborne Transponder, AN/APX-68 (AIMS Program)," DA Project No. 1-E-6-50212-326-D-10, USATECOM Project No. 4-4-6015-04, US Army Electronics Proving Ground, October 1967, classified Confidential.

e. Final Report, "Service Test of the AN/APX-72 Lightweight Airborne Transponder Set," USATECOM Project No. 4-4-6015-13, US Army Aviation Test Board, November 1968, classified Confidential.

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SUBJECT: Supplemental Report of Service Test of AN/APX-68 Lightweight Airborne Transponder, RDT&E Project No. 1-E-6-50212-D-326-10, USATECOM Project No. 4-4-6015-05

2. BACKGROUND

The AN/APX-68 Lightweight Airborne Transponder was service tested by the US Army Aviation Test Board (USAAVNTBD) during the period 18 October 1965 - 31 March 1966 at Fort Huachuca, Arizona; Fort Bliss, Texas; and Fort Rucker, Alabama. A report was submitted on 3 June 1966 (reference 1c). This report concluded that, on the basis of 150 test hours, the AN/APX-68 was considered suitable for Army use. However, it recommended that type classification be held in abeyance pending completion of the maintenance evaluation, and the USAAVNTBD was directed to continue testing the AN/APX-68 on a "lowest-priority" basis to obtain sufficient data to determine whether it met the maintainability and reliability criteria contained in the Qualitative Materiel Requirement (QMR).

3. DESCRIPTION OF MATERIEL

The AN/APX-68 Lightweight Airborne Transponder is an airborne beacon which provides automatic radar identification to all suitably equipped interrogation stations within the operational range of the system. The transponder receives, decodes, and responds to the characteristic interrogations of operational Modes 1, 2, and 3/A. When used with necessary auxiliary equipment, the transponder will respond to valid Mode C and Mode 4 interrogations. The AN/APX-68 consists of:

a. RT-744( )/APX-68 Receiver-Transmitter with MT-3287( )/APX-68 Mounting.

b. C-6280( )/APX Transponder Control.

c. AT-884/APX Antenna.

4. OBJECTIVE

To determine suitability of the AN/APX-68 for Army use.

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5. SUMMARY OF RESULTS

Detailed test results are attached as inclosure 1. The AN/APX-68 met the maintainability and reliability criteria of the QMR with the exception of the required Mean Time Between Failure (MTBF). A 300-hour MTBF was required. The MTBF achieved was 90 hours to a confidence level of 90 percent.

6. DISCUSSION

Test data contained in the engineering test report (reference 1d) were reviewed and considered in arriving at a conclusion. It was noted that the AN/APX-68 failed major portions of the engineering test. The USAAVNTBD has recently completed the service test of the AN/APX-72 Airborne Transponder Set (reference 1e). This set was found suitable for Army use. During 1,982 test hours, the AN/APX-72 achieved an MTBF of 300 hours at a confidence level of 90 percent. On the basis of engineering test results and the low MTBF of the AN/APX-68, when compared with the service test results of the AN/APX-72, the AN/APX-68 does not appear to warrant any further consideration for use in the Army AIMS program.

7. CONCLUSION

The AN/APX-68 is not suitable for Army use.

8. RECOMMENDATION

The AN/APX-68 be given no further consideration.

FOR THE PRESIDENT:

2 Incl
as

A. J. MONTCALMO
1LT, AGC
Acting Adjutant

STEBG-TD
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DETAILS OF TEST

AN/APX-68 LIGHTWEIGHT AIRBORNE TRANSPONDER

1. INTRODUCTION

During the service test, 150 hours were accumulated on two AN/APX-68's installed in an OV-1C Airplane and a UH-1D Helicopter. These aircraft were transferred and the test items removed. In June 1966 one AN/APX-68 was installed in a U-6A Airplane, and the other was used as a spare. The test was conducted on a "lowest-priority" basis until sufficient data could be collected to evaluate maintainability and reliability. The test was completed in October 1968.

2. MAINTAINABILITY

a. Objective

To determine whether the AN/APX-68 meets the maintainability criteria of the QMR.

b. Method

(1) The test item was examined to determine whether special tools were required to remove and replace the major components in the field.

(2) The design was evaluated to determine whether it permitted easy removal and replacement of defective components and whether the design facilitated troubleshooting, repair, and alignment in an orderly, sequential manner.

(3) Maintenance actions were evaluated to determine mean downtimes at organizational and field maintenance levels.

c. Results

(1) No special tools were required to remove and replace major components.

(2) The design permitted easy removal and replacement of modules and subassemblies. However, due to the packaging density,

troubleshooting and repair beyond the module or subassembly level were tedious and time consuming and required great care to prevent damage to adjacent circuits.

(3) Mean downtime at the organizational level was 1.6 hours. Mean downtime at the field maintenance level was 3.6 hours for module or subassembly replacement and 11.3 hours for module or subassembly repair.

(4) A record of maintenance performed is contained in annex A.

3. RELIABILITY

a. Objective

To determine whether the test item meets the MTBF criteria of the QMR.

b. Method

(1) All scheduled and unscheduled maintenance was recorded. Maintenance and Reliability Analysis Charts and Parts Usage Charts were kept in accordance with USATECOM Regulation 750-15.

(2) Reliability data were derived from charts contained in letter, AMSTE-BG, Headquarters, USATECOM, 4 January 1968, subject: "Reliability Test Management Charts."

c. Results

(1) Six failures occurred during 962 hours of operation. An MTBF of 90 hours to a confidence level of 90 percent was achieved.

(2) Maintenance and Reliability Charts are contained in annex A, and Parts Usage Charts in annex B.

4. SUITABILITY OF TOOLS AND TEST EQUIPMENT

a. Objective

To determine adequacy of standard tools and test equipment and what special tools and test equipment are necessary for organizational, direct-, and general-support categories of maintenance.

b. Method

Tools and test equipment allocated were used in accordance with prescribed maintenance procedures to determine that procedures and tools were adequate, simple, and not considered excessive on the basis of experience with similar items.

c. Results

(1) No special tools were required to maintain the test item.

(2) Three pieces of special test equipment, the AN/APM-156 Transponder Test Set, the AN/APM-123( ) Transponder Test Set, and the AN/UPM-98 Radar Test Set were utilized during the test and were adequate.

(3) Special Tool Analysis Charts are contained in annex C.

5. ADEQUACY OF TECHNICAL MANUSCRIPTS AND MANUALS

a. Objective

To determine that maintenance instructions in technical manuscripts and manuals and maintenance charts are adequate for the intended category of maintenance.

b. Method

Technical manuals (TM's) and maintenance instructions were analyzed throughout the test to evaluate adequacy and completeness.

c. Results

(1) TM 11-5895-360-12 (Preliminary Organizational Maintenance Manual) was adequate.

(2) TM 11-5895-360-34 (Direct and General Support Maintenance Manual) was adequate.

(3) Air Force Technical Order 12P4-2APX-142 (Field Maintenance of Control, Transponder C-6280) was adequate but was not in standard Army format.

(4) Maintenance Package Literature Charts are contained in annex D.

6. PERSONNEL AND TRAINING

a. Objective

To determine:

(1) Operator training requirements.

(2) Maintenance manpower and training requirements.

b. Method

(1) The AN/APX-68 was operated by aviators using a printed instruction card for Modes 1, 2 and 3/A.

(2) The test item was maintained by Aviation Navigation Equipment Repairman (MOS 35M20) with four weeks' factory training, and an Airborne Radar Repairman (MOS 26N20) with six weeks' on-the-job training. Maintenance operations performed were monitored to determine whether the training received was adequate for the appropriate maintenance level.

c. Results

(1) Aviators could satisfactorily operate the transponder in all modes after a five-minute orientation.

(2) No formal training was required to perform organizational maintenance on the test item.

(3) Four weeks of factory training for MOS 35M20 and six weeks of on-the-job training for MOS 26N20 were adequate for maintenance through the direct- and general-support levels.

7. COMPARISON WITH QMR

a. Objective

To determine whether the AN/APX-68 meets the criteria of the QMR.

b. Method

The results of the test were compared with those criteria of the QMR applicable to this portion of the test.

c. Results

QMR	AN/APX-68 Meets QMR
* * * * *	
9. Maintenance Characteristics:	
a. (Essential) The equipment must be capable of receiving "Ramp Test" signals to provide ground check of receiver sensitivity, decoder performance, encoder performance, and transmitter power output and frequency.	Yes. See paragraph 4. c. (2).
b. (Essential) Major components, fuzes and lamps must be replaceable by organizational maintenance personnel as a result of "Ramp Test" determination of component failure.	Yes. See paragraph 2. c. (2).
c. (Essential) Mean down time will not exceed 2 hours (1 hour desirable) at organizational level, and 4 hours (3 hours desirable) at field maintenance level.	Yes. See paragraph 2. c. (3).
d. (Essential) The equipment will be designed to provide a minimum of 300 hours mean time between failure (MTBF) (800 hours MTBF desired) with a minimum operating life of 5, 000 hours.	No. See paragraph 3. c. (1).

QMR	AN/APX-68 Meets QMR
e. (Essential) Turnaround and reaction times - compatible with airframe in which installed.	Yes. See paragraph 2. c. (3).
f. (Essential) Maximum use will be made of modules, and printed boards to enable field maintenance personnel, using relatively simple bench checks, to locate and replace faulty elements.	Yes. See paragraph 2. c. (3).
g. (Essential) The Mode 4 (Mark XII) component of the transponder shall be replaceable as a single unit.	Not determined. Not within the scope of this test.

ANNEX A

MAINTENANCE AND RELIABILITY ANALYSIS CHART

INSTRUCTION SHEET - SECTION 1

COLUMN	DESCRIPTION
1	Entry number of each item.
2	Group number as indicated in the Maintenance Allocation Chart.
3	Component and related operations as indicated in the Maintenance Allocation Chart. Operations indicated as in Depot Category are not shown.
4	Maintenance Level, Prescribed. Category prescribed by the Maintenance Allocation Chart is indicated by utilizing the letters O/C, O, DS, or GS. O/C - Operator or crew; O - Organizational; DS - Direct Support; GS - General Support.
5	Maintenance Level, Recommended. Letters O/C, O, DS, or GS indicate the category recommended by the test agency.
6	TM Instructions, Adequate. An X in this column indicates the TM instructions are considered adequate.
7	TM Instructions, Inadequate. The test agency reference number used on DA Forms 1598/2028 is indicated in this column, if the instructions are considered inadequate.
8	Active Maintenance Time. Man-hours used to the closest tenth. If the operation was not actually performed but was reviewed, the estimated active maintenance time is indicated by using the prefix E. Average active maintenance time is used if the operation was performed more than once.
9	Life. Number of hours, miles, or rounds accumulated before or since this operation was performed. An entry is made each time this operation is performed, followed by the appropriate life unit; i.e., M, H, or R. An "S" will be placed in this column if the operation was performed on a sampling basis and not because of an actual failure.
10	Reason performed. The symbol "Unsched" will be shown in this column if the operation was performed as a result of unscheduled maintenance. If the operation was performed as a result of scheduled maintenance, it is indicated by the symbol "Sched" in this column. If the operation was performed only to verify procedures and tools, not as a result of breakdown, it is indicated by the symbol "Sim" in this column.

COLUMN	DESCRIPTION
11	Remarks. If the operation is related to any other sub-test covered in the body of the test report, the paragraph number is inserted for cross reference. If the operation was not performed as a result of using the sampling technique authorized by AR 750-6, one of the following remarks is entered as appropriate. a. Reviewed - not performed. b. Neither reviewed nor performed due to (No TM's) or (insufficient service test time). c. Other, as appropriate. If an EPR is related to a maintenance operation, the EPR number will be inserted.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION II)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Pre-scribed	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Recom-mended	TM INSTRUCTIONS: Ade-quate	TM INSTRUCTIONS: Inade-quate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
1		AN/APX-68 Transponder Test Set						166.0 H	Scheduled	Initial acceptance inspection performed upon receipt of test item at USAAVNTBD in May 6€; Receiver-Transmitter, Radar RT-744 (XE-1)/APX-68 (S/N 5); Mounting MT-3287 (XE-1)/ APX-68 (S/N 1); and Control, Transponder Set C-6280(P)/ APX-68 (S/N 33).
		Initial Inspection:								
		a. Visual		DS	X		1.0			Check for completeness of equipment, damage by shipment, security of installed plug-in items such as modules and fuses, and condition of equipment in general.
		b. Bench tests		GS	X		8.0			Minimum performance checks using AN/UPM-98.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION I)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct CS - General: Prescribed	O/C - Oper/Crew O - Orgzn DS - Direct CS - General: Recommended	TM INSTRUCTIONS: Adequate	TM INSTRUCTIONS: Inadequate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
		c. Aircraft preflight		O	X		1.0			Used AN/APM-156 Radar Test Set to verify adequacy of wiring provisions in test-bed aircraft and to assure satisfactory system operation.
2		AN/APX-68 Transponder Test Set						191.2 H	Scheduled	25-hour intermediate inspection of system installed in U-6A, S/N 53-7913.
		Intermediate Inspection:								
		a. RT-744(XE-1)/APX-68 and MT-3287(XE-1)/APX-68		O	X		0.2			Visual inspection only. Power-on check not required.
		b. C-6280(P)/APX-68		O		X	0.1			TO 12P4-2APX-142 is an Air Force field maintenance manual; it is not in standard TM format and does not include preventive maintenance or MAC's.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION ..)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
3		AN/APX-68 Transponder Set						203.0 H	Unscheduled.	In-flight failure reported. EPR KF-1 submitted.
		a. Test - Power-on inspection		O	X		0.6			Verify failure and locate fault. System failed go/no-go test with AN/APM-156.
		b. Repair - Remove and reinstall RT-744(XE-1)/APX-68		O	X		0.2			Remove inoperable unit for bench repair.
		c. Test - Power-on inspection		O	X		0.5			Final test to verify repair.
		RT-744(XE-1)/APX-68 Receiver-Transmitter								
		a. Test - Bench check		GS	X		1.6			Verify failure and isolate defective module. Decoder module 1A5 inoperative, transmitter

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION I)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
										module 1A10 weak, contacts on receptacle 1J1 dirty.
	1A5	b. Repair		GS	X		1.2			Locate and replace defective part. Capacitor C-7 shorted.
	1A5 1A10	c. Replace		DS	X		0.1			Install serviceable modules.
	1J1	d. Service		O	X		0.1			Improper electrical contact. Cleaned pins at external receptacle.
		e. Test		GS	X		1.0			Final test to verify repair.
4		AN/APX-68 Transponder Set		O	X		0.2	228.5 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION I)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
5		AN/APX-68 Transponder Set		O	X		0.2	255.0 H	Scheduled.	25-hour intermediate inspection.
6		AN/APX-68 Transponder Set						282.2 H	Scheduled.	100-hour periodic inspection of system installed in U-6A.
		Periodic Inspection:								
		a. Visual - Power off		O	X		0.2			
		b. Test - Power on		O	X		0.5			Minimum performance checks using AN/APM-156.
7		AN/APX-68 Transponder Set (installed in U-6A SN 53-7913)						307.4 H	Unscheduled.	In-flight failure reported. EPR KF-2 submitted.
		a. Test - Powe-on inspection)		O	X		0.5			System failed go/no-go test with AN/APM-156. Verify failure and locate fault.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION-1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Pre-scribed	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Recom-mended	TM INSTRUCTIONS: Ade-quate	TM INSTRUCTIONS: Inade-quate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
		b. Repair - Remove and reinstall RT-744(XE-1)/APX-68		O	X		0.2			Remove inoperable unit for bench repair.
		c. Test - Power-on inspection RT-744(XE-1)/APX-68 Receiver-Transmitter		O	X		0.5			Final test to verify repair.
		a. Test - Bench check		GS	X		3.3			Verify failure and locate fault. The 6.3-v.a.c. filament voltage was intermittent at Pins E and F of receiver module 1A9.
		b. Repair		GS	X		0.3			Repair exposed wire that was causing short.
		c. Test		GS	X		1.5			Final test to verify repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION I)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Pre-scribed	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Recom-mended	TM INSTRUCTIONS: Ade-quate	TM INSTRUCTIONS: Inade-quate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
8		AN/APX-68 Transponder Set		0	X		0.2	333.0 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
9		AN/APX-68 Transponder Set		0	X		0.2	360.0 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
10		AN/APX-68 Transponder Set		0	X		0.2	384.5 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
11		AN/APX-68 Transponder Set						410.0 H	Scheduled.	100-hour periodic inspection of system installed in U-6A.
		Periodic Inspection:								
		a. Visual (Power off)		0	X		0.2			
		b. Test (Power on)		0	X		0.5			
12		AN/APX-68 Transponder Set		0	X		0.2	436.6 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Pre-scribed	O/C - Oper/Crew O - Orgzn DS - Direct GS - General: Recom-mended	TM INSTRUCTIONS: Ade-quate	TM INSTRUCTIONS: Inade-quate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
13		AN/APX-68 Transponder Set		O	X		0.2	462.5 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
14		AN/APX-68 Transponder Set		O	X		0.2	488.8 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
15		AN/APX-68 Transponder Set						501.3 H	Unscheduled.	In-flight failure reported. EPR's KF-3A and -3B submitted.
		a. Test - Power on inspection		O	X		0.6			Verify failure and locate fault. System failed go/no-go test with AN/APM-156.
		b. Repair - Remove and reinstall RT-744(XE-1)/ APX-68.		O	X		0.2			Remove inoperable unit for bench repair.
		c. Test - Power on inspec-tion		O	X		0.5			Final test to verify repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgn DS - Direct GS - General: Prescribed	O/C - Oper/Crew O - Orgn DS - Direct GS - General: Recommended	TM INSTRUCTIONS: Adequate	TM INSTRUCTIONS: Inadequate 1598/2028	ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
1	2	3	4	5	6	7	8	9	10	11
15 (Cont)		RT-744(XE-1)/APX-68 Receiver-Transmitter								
		a. Test - Bench test		GS	X		9.2			Verify failure and locate fault.
		b. Repair		GS	X					
	1A5	(1) Decoder module					0.8			Internal failures. Repaired open circuit in printed circuit board at capacitor C-25 and replaced broken resistor R-99.
	1A6	(2) Coder module		GS	X		2.0			Out of adjustment. Adjusted C-19 for 1/45 m.sec pulse spacing.
	1A7/ 1A8	(3) Delay line and code select module		GS	X		0.1			Part defective. Replaced, could not repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
15 (Cont)	1A9	(4) Receiver Module		GS	X		0.1			Internal failure. Replaced, could not repair.
	1A11	(5) Power Supply Module		GS	X		0.6			Internal failure. Replaced CR-16, CR-17, and R-27.
		c. Test		GS	X		1.8			Final test to verify repair.
16		AN/APX-68 Transponder Set						505.3 H	Unscheduled.	Failure reported during postflight. EPR KF-4 submitted.
		a. Test - Power-on inspection		O	X		0.8			Verify failure and locate fault.
		b. Repair		DS	X		2.6			Improper electrical contact. Replaced receptacle on mount.
		c. Test - Power-on inspection.		O	X		0.6			Final test to verify repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION I)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
17		AN/APX-68 Transponder Set						530.0 H	Scheduled.	100-hour periodic inspection of system installed in U-6A.
		Periodic Inspection:								
		a. Visual (power off)		O	X		0.2			
		b. Test (power on)		O	X		0.5			
18		AN/APX-68 Transponder Set		O	X		0.2	558.5 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
19		AN/APX-68 Transponder Set						573.4 H	Unscheduled.	In-flight failure reported. Submitted EFR No. KF-5A and KF-5B.
		a. Test - Power-on inspection		O	X		0.6			Verify failure and locate fault.
		b. Repair - Remove and reinstall RT-744(XE-1)/APX-68		O	X		0.2			Remove inoperable unit for bench repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
19(Cont)		c. Test - Power-on inspection		O	X		0.5			Final test to verify repair.
		RT-744(XE-1) Receiver-Transmitter								
		a. Test - Bench test		GS	X		0.5			Verify failure and locate fault.
		b. Repair		GS	X		1.0			Out of adjustment. Adjusted transmitter power, receiver sensitivity, and MTL.
		c. Test		GS	X		0.5			Final test to verify repair.
20		AN/APX-68 Transponder Set		O	X		0.2	598.0 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
21		AN/APX-68 Transponder Set		O	X		0.2	626.2 H	Scheduled.	25-hour intermediate inspection of system installed in U-6A.
22		AN/APX-68 Transponder Set						650.0 H	Scheduled.	100-hour periodic inspection.
		Periodic Inspection:								
		1. Visual (Power off)		O	X		0.2			
		2. Test (Power on)		O	X		0.5			
23		AN/APX-68 Transponder Set		O	X		0.2	676.5 H	Scheduled.	25-hour intermediate inspection.
24		AN/APX-68 Transponder Set		O	X		0.2	701.0 H	Scheduled.	25-hour intermediate inspection.
25		AN/APX-68 Transponder Set		O	X		0.2	724.5 H	Scheduled.	25-hour intermediate inspection.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
26		AN/APX-68 Transponder Set						751.0 H	Scheduled.	100-hour periodic inspection.
		Periodic Inspection:								
		1. Visual (Power off)		O	X		0.2			
		2. Test (Power on)		O	X		0.5			
27		AN/APX-68 Transponder Set		O	X		0.2	777.0 H	Scheduled.	25-hour intermediate inspection.
28		AN/APX-68 Transponder Set		O	X		0.2	805.0 H	Scheduled.	25-hour intermediate inspection.
29		AN/APX-68 Transponder Set		O	X		0.2	830.5 H	Scheduled.	25-hour intermediate inspection.
30		RT-744(XE-1)/APX-68 Receiver-Transmitter						845.1 H	Unscheduled.	In-flight failure reported. EPR KF-6 submitted.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 1)

ENTRY NO	GROUP NO	COMPONENT AND RELATED OPERATIONS	O/C - Oper/Crew O - Orgzn DS - Direct GS - General		TM INSTRUCTIONS		ACTIVE MAINT TIME	LIFE M - Miles H - Hours R - Rounds	REASON PERFORMED	REMARKS
			Pre-scribed	Recom-mended	Ade-quate	Inade-quate 1598/2028				
1	2	3	4	5	6	7	8	9	10	11
30(cont		a. Test - Power-on inspection		O	X		0.8			Verify failure and locate fault. System failed go/no-go test with AN/APM-123.
		b. Repair - Remove and reinstall RT-744(XE-1)/APX-68		O	X		0.2			Remove inoperable unit for bench repair.
		c. Test - Power-on inspection		O	X		0.5			Final test to verify repair.
		RT-744(XE-1)/APX-68 Receiver-Transmitter								
		a. Test - Bench test		GS	X		2.0			Verify failure and locate fault.
	1A11	b. Repair		GS	X		0.6			Internal failure. Replaced CR-17, CR-18, and R-28.
		c. Test		GS	X		1.5			Final test to verify repair.

MAINTENANCE AND RELIABILITY ANALYSIS CHART

INSTRUCTION SHEET - SECTION 2

COLUMN	DESCRIPTION
1	Entry number which will correspond to the same item entry in Section 1.
2-5	Appropriate man-hours used to the closest tenth. If man-minutes are a more appropriate unit of measure, so stipulate in Column 8, Remarks.
6	Total man-hours as recorded in Columns 2 through 5.
7	Man-hours used to the closest tenth.
8	Remarks as appropriate.

MAINTENANCE AND RELIABILITY ANALYSIS CHART
(SECTION 2)

ENTRY NO	PREPARATION TIME	FAULT CORRECTION TIME	ADJUSTMENT AND CALIBRATION TIME	FINAL TEST TIME	TOTAL TIME	FAULT LOCATION TIME	REMARKS
1	2	3	4	5	6	7	8
3	0.3	0.6	0.0	1.4	2.3	3.0	EPR KF-1.
7	0.3	0.5	0.0	1.9	2.7	3.6	EPR KF-2.
15	0.3	1.8	2.0	2.2	6.3	9.6	EPR's KF-3A and -3B.
16	0.2	2.6	0.0	0.5	3.3	0.7	EPR KF-4.
19	0.3	0.2	1.0	0.9	2.4	0.9	EPR's KF-5A and -5B.
30	0.3	0.8	0.0	1.9	3.0	2.6	EPR KF-6.

ANNEX B

PARTS ANALYSIS CHART

INSTRUCTION SHEET

GENERAL: Parts will be assembled on this chart by functional groups and in numerical order within groups.

COLUMN	DESCRIPTION
1	Record one of the following: Federal Stock Number, Technical Service Part Number, Manufacturer's Part Number, or Drawing Number in this order of preference.
2	Noun Nomenclature. Self-explanatory.
3	Maintenance Level, Prescribed. Maintenance level as prescribed by the parts list under review: O/C - Operator/Crew; O - Organizational; DS - Direct Support; GS - General Support.
4	Maintenance Level, Recommended. O/C, O, DS, or GS indicate Maintenance Level recommended by the test agency.
5	Life. The number of hours, miles, or rounds accumulated before or since this part was replaced. An entry in this column is made for each part used followed by the appropriate life unit; i.e., M, H, or R.
6	Reason Used. The symbol "Unsched" will be shown in this column if the part was used as a result of unscheduled maintenance. If the part used was the result of scheduled maintenance, the symbol "Sched" will be used. If the part was consumed to verify procedures or tools, not as a result of breakdown, the symbol "Sim" will be used.
7	Group Number, Cross Reference. Parts usage by maintenance operation is indicated by cross referencing to the group number from Column 2 of the Maintenance and Reliability Analysis Chart.
8	Remarks. If the part usage is related to any other subtest covered in the body of the test report, the paragraph number for cross reference is indicated. If an EPR is related to the part used, the EPR number will be inserted in this column.

PARTS ANALYSIS CHART

FEDERAL STOCK NUMBER	NOUN NOMENCLATURE	MAINTENANCE LEVEL O/C - Operator/Crew O - Orgzn DS - Direct GS - General		LIFE M - Miles H - Hours R - Rounds	REASON USED	GP NO CROSS REFERENCE	REMARKS
		Pre-scribed	Recom-mended				
1	2	3	4	5	6	7	8
Unknown	Capacitor C-7		GS	203.0 H	Unsched	1A5	EPR KF-1.
Unknown	Transmitter Module		GS	203.0 H	Unsched	1A10	EPR KF-1.
Unknown	Resistor R-99		GS	501.3 H	Unsched	1A5	EPR's KF-3A and -3B.
Unknown	Delay Line Module and Code Select Module		GS	501.3 H	Unsched	1A7/1A8	EPR's KF-3A and -3B.
Unknown	Receiver Module		GS	501.3H	Unsched	1A9	EPR's KF-3A and -3B.
Unknown	Diode CR-16		GS	501.3 H	Unsched	1A11	EPR's KF-3A and -3B.
Unknown	Diode CR-17		GS	501.3 H	Unsched	1A11	EPR's KF-3A and -3B.
Unknown	Resistor R-27		GS	501.3 H	Unsched	1A11	EPR's KF-3A and -3B.
Unknown	Connector PN DPJ-53C10-34S-B		DS	505.3 H	Unsched	1P1	EPR KF-4.

PARTS ANALYSIS CHART

FEDERAL STOCK NUMBER	NOUN NOMENCLATURE	MAINTENANCE LEVEL O/C - Operator/Crew O - Orgzn DS - Direct GS - General		LIFE M - Miles H - Hours R - Rounds	REASON USED	GP NO CROSS REFERENCE	REMARKS
		Pre-scribed	Recom-mended				
1	2	3	4	5	6	7	8
Unknown	Diode CR-17		GS	845.1 H	Unsched	1A11	EPR KF-6.
Unknown	Diode CR-18		GS	845.1 H	Unsched	1A11	EPR KF-6.
Unknown	Resistor R-28		GS	845.1 H	Unsched	1A11	EPR KF-6.

ANNEX C

SPECIAL TOOL ANALYSIS CHART

INSTRUCTION SHEET

GENERAL: All special tools provided with the test item will be evaluated to determine their function, adequacy, category of use and desirability. Any requirement for additional special tools or recommendation for deletion of special tools will also be reported.

COLUMN	DESCRIPTION
1	List all special tools, their noun nomenclature, and identifying part number.
2	Give function of special tool.
3,4	List maintenance category that special tool was designed to be used at in column 3. In column 4 indicate confirmation or recommendation for usage.
5,6	Indicate the adequacy/inadequacy of the special tool in relation to its intended use.
7	Include information as to change in category of use (column 4) or inadequacy of the tool (column 6). Refer to paragraph in report that contains substantiating data.

SPECIAL TOOL ANALYSIS CHART

SPECIAL TOOL	FUNCTION	MAINTENANCE LEVEL O - Orgzn DS - Direct GS - General		EVALUATION		REMARKS
		Pre-scribed	Recom-mended	Ade-quate	Inade-quate	
1	2	3	4	5	6	7
AN/UPM-98 Radar Test Set	The AN/UPM-98 is a radar test set designed for DS and GS maintenance.	DS/GS	DS/GS	X		The AN/UPM-98 was adequate for minimum performance checks, troubleshooting, and final testing.
AN/APM-156 Trans-ponder Test Set	The AN/APM-156 is a portable test set designed for go/no-go testing of aircraft transponders.	O	O	X		The AN/APM-156 was adequate for go/no-go testing in Modes 1, 2, and 3/A.
AN/APM-123( ) Trans-ponder Test Set	The AN/APM-123 transponder test set is a portable test set designed for go/no-go testing of aircraft transponders.	O/DS/GS	O/DS/GS	X		The AN/APM-123 was adequate for go/no-go testing in Modes 1, 2, and 3. Mode C and Mode 4 were not tested.

ANNEX D

MAINTENANCE PACKAGE LITERATURE CHART

INSTRUCTION SHEET

COLUMN	DESCRIPTION
1	Give Army publication or draft manual number.
2	Number of copies received. Insert "O" if none were supplied. Use Para IIIi, Chapter 9, of AR 310-3 as a guide to determine those manuscripts and publications that should accompany the test item. Manuscripts and publications contained in the maintenance package should cover operation functions through general support maintenance and should specify the categories involved.
3	Complete title.
4	Fill in date manuscript (MSS) or publication was received.
5	Fill in date test item or materiel was received.
6,7	Insert "X" in appropriate block. Minor errors on 1598/2028 forms are not in themselves sufficient reason to term a manuscript inadequate. Evaluation may be omitted if fewer than 25 percent of the specified maintenance operations were performed.
8	Insert date 1598 form was forwarded.
9	In addition to appropriate remarks, explain if manuscript was not evaluated.

MAINTENANCE PACKAGE LITERATURE CHART

MANUSCRIPT DATE RECEIVED EVALUATION FORM 1598/2028

NUMBER	QNTY	TITLE	LIT	MATERIEL	ADQT	INADQT	DATE FWD'D	REMARKS
1	2	3	4	5	6	7	8	9
TO 12P4-2APX-142	3	Technical Manual Field Maintenance and Overhaul with Parts Breakdown, Control, Transponder Set C-6280 (P)/APX and C-6717/APX-64(V) (dtd 15 Oct 1966)	13 July 1967	28 May 1966	X			Adequate but not in atandard Army format.
POMM 11-5895-360-12	3	Preliminary Operator and Organizational Maintenance Manual, Receiver-Transmitter Radar, RT-744(XE-1)/APX-68 and Mounting MT-3287/APX-68		28 May 1966	X			

MAINTENANCE PACKAGE LITERATURE CHART

MANUSCRIPT			DATE RECEIVED		EVALUATION		FORM 1598/2028	
NUMBER	QNTY	TITLE	LIT	MATERIEL	ADQT	INADQT	DATE FWD'D	REMARKS
1	2	3	4	5	6	7	8	9
POMM 11-5895-360-34	3	Technical Instructions (DS and GS Maintenance Manual) for Receiver-Transmitter, Radar RT-744(XE-1)/APX-68 and Mounting MT-3287/APX-68 (dtd 16 Aug 1965)		28 May 1966	X			